

## The Mediating Role of Self-Esteem in the Effect of Muscle Dysmorphia on Exercise Dependence

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### Abstract

**Aim:** The aim of this study was to determine the mediating role of self-esteem in the effect of muscle dysmorphia on exercise dependence in young men.

**Method:** This descriptive study was conducted with 500 male individuals aged 18-30 years living in Turkey. Data were collected using the "Descriptive Information Form", the "Muscle Dysmorphia Disorder Inventory", the "Exercise Dependence Scale" and the "Rosenberg Scale of Self-esteem".

**Results:** The effect of muscle dysmorphia on exercise dependence was found to be significant and positive. The effect of self-esteem level on exercise dependence was found to be significant and negative. It was determined that the effect of "Muscle Dysmorphia Inventory" on "Exercise Dependence Scale" was realized through the variable "Rosenberg Scale of Self-esteem" ( $B=-0.08$ ,  $\beta=-0.03$ ,  $SH=0.02$ ,  $LLCI=-0.13$ ,  $ULCI=-0.04$ ). This finding shows that each unit increase in the "Muscle Dysmorphia Disorder Inventory" score causes a 0.08 unit decrease in the "Exercise Dependence Scale" score through the "Rosenberg Scale of Self-esteem", in other words, there is a mediation effect.

**Conclusion:** In this study, it was determined that high levels of muscle dysmorphia increased the risk of exercise dependence in young men, but self-esteem had a decreasing role on this negative effect.

**Keywords:** Self-esteem, exercise dependence, muscle dysmorphia.

### Kas Dismorfisinin Egzersiz Bağımlılığına Etkisinde Benlik Saygısının Aracı Rolü

### Öz

**Amaç:** Bu çalışmanın amacı; genç erkeklerde kas dismorfisinin egzersiz bağımlılığına etkisinde benlik saygısının aracılık rolünün belirlenmesidir.

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**ETHICAL STATEMENT:** Ethics committee approval for the study was received from the Üsküdar University Ethics Committee (2024-61351342/020-132).

**Yöntem:** Tanımlayıcı nitelikteki bu çalışma, Türkiye’de yaşayan 18-30 yaş arasındaki 500 erkek birey ile gerçekleştirilmiştir. Veriler “Tanımlayıcı Bilgi Formu”, “Kas Algısı Bozukluğu Envanteri”, “Egzersiz Bağımlılığı Ölçeği” ve “Rosenberg Benlik Saygısı Ölçeği” ile toplanmıştır.

**Bulgular:** Kas dismorfisinin egzersiz bağımlılığı üzerindeki etkisinin anlamlı ve pozitif yönde olduğu belirlenmiştir. Benlik saygısı düzeyinin egzersiz bağımlılığı üzerindeki etkisinin ise anlamlı ve negatif yönde olduğu saptanmıştır. “Kas Algısı Bozukluğu Envanteri”nin “Egzersiz Bağımlılığı Ölçeği” üzerindeki etkisinin “Rosenberg Benlik Saygısı Ölçeği” değişkeni aracılığıyla gerçekleştiği belirlenmiştir ( $B=-0,08$ ,  $\beta=-0,03$ ,  $SH=0,02$ ,  $LLCI=-0,13$ ,  $ULCI=-0,04$ ). Bu bulgu, “Kas Algısı Bozukluğu Envanteri” puanındaki her bir birimlik artışın, “Rosenberg Benlik Saygısı Ölçeği” aracılığıyla “Egzersiz Bağımlılığı Ölçeği” puanında 0,08 birimlik bir azalmaya neden olduğu diğer bir ifade ile aracılık etkisinin olduğunu göstermektedir.

**Sonuç:** Bu çalışmada, genç erkeklerde kas dismorfisi düzeyinin yüksek olmasının egzersiz bağımlılığı görülme riskini artırdığı fakat bu negatif etki üzerinde benlik saygısının azaltıcı rolünün olduğu belirlenmiştir.

**Anahtar Sözcükler:** Benlik saygısı, egzersiz bağımlılığı, kas dismorfisi.

## Introduction

Body image is a multidimensional structure that includes cognitive, emotional and behavioral elements, in other words, an individual's perceptions, feelings, thoughts and behaviors about their own body<sup>1,2</sup>. Body image can be positive or negative. Self-dissatisfaction, which is one of the indicators of negative body image, is frequently seen in men. Men may experience psychological problems due to dissatisfaction with their bodies. One of these problems is muscle dysmorphia. Muscle dysmorphia is a condition in which a person has an unrealistic perception of their own muscles. These individuals may experience a constant feeling of dissatisfaction with their muscles and tend to perceive their muscles as smaller or inadequate<sup>3,4</sup>. This perception can negatively affect one's self-esteem. Individuals may face problems such as low self-esteem, self-dislike, social inhibition, and even depression. Therefore, there is a positive relationship between a positive body perception and healthy self-esteem<sup>5,6</sup>. Although the prevalence of muscle dysmorphia in the general population is not yet known, it is accepted that it is much more common in men than in women<sup>3,4</sup>. In a study conducted with Australian individuals, the prevalence of muscle dysmorphia was found to be 2.2% among men<sup>7</sup>.

Men can try various methods to cope with dissatisfaction with their bodies. Among these, exercise is the most common method. Exercising to achieve the desired body shape can turn into exercise dependence over time. Exercise dependence is a state of excessive exercise in which moderate to intense physical activity turns into a compulsive behavior, i.e. engaging in exercise routines, excessive exercise and inability to control exercise behavior. The individual is driven to exercise for longer and more regular periods of time, to the detriment of their personal, social and professional life, even ignoring clinical advice or treatment, regardless of the detrimental health consequences. They exercise even when exhausted, injured or ill. When the individual abstains from exercise, they show withdrawal symptoms characterized by behavioral dependences<sup>8,9</sup>. In a study

conducted with elite athletes and sports science faculty students, it was determined that male athletes had high levels of exercise dependence<sup>10</sup>.

Exercise dependence is a disorder characterized by excessive and obsessive exercise patterns that ultimately lead to physical and psychological distress. Dissatisfaction with one's current appearance plays an important role in the formation of exercise dependence<sup>11</sup>. Low self-esteem is among the triggering effects of exercise dependence<sup>12</sup>. In the study conducted by Wågan et al. (2021), it was determined that individuals who exercise more than 9 hours a week have lower self-esteem levels<sup>13</sup>.

In the literature, it is stated that the incidence of muscle dysmorphia and exercise dependence in young men is high, but there is no study addressing the mediating role of self-esteem, which may be a trigger in muscle dysmorphia and exercise dependence<sup>4,10</sup>. In this respect, it is thought that the study will contribute to the literature. In addition, the study will contribute to the development of knowledge about muscle dysmorphia and exercise dependence, which can lead to many negative consequences in young men, to investigate the variables associated with them, and to develop interventions to increase self-esteem. For this reason, this study was conducted to investigate the mediating role of self-esteem in the effect of muscle dysmorphia on exercise dependence in young men.

## **Material and Methods**

### ***Type of Research***

This study used a descriptive research design.

### ***Time of the Research***

The research was conducted between June and September 2024.

### ***Population and Sample of the Study***

The population of the study consisted of men between the ages of 18-30 living in Turkey. According to TurkStat data, the male population between the ages of 18 and 30 in Turkey is approximately 6 million 673 thousand 163 people<sup>14</sup>. While determining the sample, the sample size calculation table developed by Yazicioğlu and Erdoğan (2004) was utilized. Accordingly, at least 384 participants with a sampling error of 0.05 ( $p=0.05$  and  $q=0.5$ ) were considered sufficient for the sample<sup>15</sup>. Snowball sampling method was used to create the sample group. Data collection forms were distributed online by researchers through social media platforms and email groups. The sample of the study consisted of 500 young male individuals.

### ***Hypotheses of the Study***

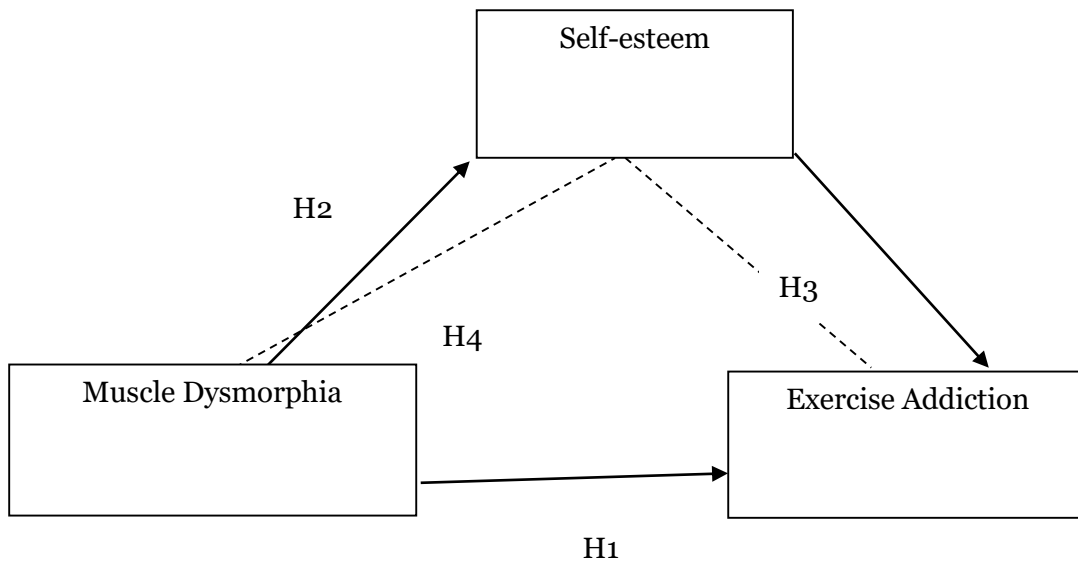
**H1:** Muscle dysmorphia positively and significantly affects exercise dependence in young men.

**H2:** Muscle dysmorphia negatively and significantly affects self-esteem in young men.

**H3:** Self-esteem negatively and significantly affects exercise dependence in young men.

**H4:** Self-esteem mediates the effect of muscle dysmorphia on exercise dependence in young men (Figure 1).

**Figure 1.** Hypotheses of the study



### ***Variables of the Study***

Independent variable: descriptive characteristics and mean score of "Muscle Dysmorphia Disorder Inventory"

Dependent variable: mean score of "Exercise Dependence Scale"

Mediator variable: mean score of "Rosenberg Scale of Self-esteem"

### ***Data Collection Tools***

The data were collected with "Descriptive Information Form", "Muscle Dysmorphia Disorder Inventory", "Exercise Dependence Scale" and "Rosenberg Scale of Self-esteem".

***Descriptive Information Form:*** This form, which was created by the researchers by reviewing the relevant literature, includes a total of 7 questions about the age, height, weight, educational status, marital status, and training status of the individuals<sup>10,16,17</sup>.

***Muscle Dysmorphia Disorder Inventory (MDDI):*** It was developed to measure the diagnostic criteria of muscle perception disorder<sup>18,19</sup>. MDDI is a 13-item, five-point Likert-type scale. The scale includes the statements "never (1), sometimes (2), undecided

(3), mostly (4) and always (5)". The score that can be obtained from the scale varies between 13-65 points. The Cronbach's Alpha of the scale was found to be .81<sup>19</sup>. Cronbach's alpha for this study is .84.

**Exercise Dependence Scale (EDS-21):** The scale is applicable to individuals aged 18 years and over. It consists of 21 items. The exercise dependence symptoms of the participants are evaluated on a 6-point Likert-type scale. A high score indicates that the person has more exercise dependence symptoms<sup>20,21</sup>. The Cronbach's Alpha of the scale in the original study was 0.90<sup>21</sup>. Cronbach's alpha for this study is .96.

**Rosenberg Scale of Self-esteem:** It was developed to determine general self-esteem through self-report<sup>22</sup>. There are 63 items in the scale consisting of 12 multiple-choice subscales. Self-esteem subscale was used in this study. The self-esteem subscale has a four-point Likert-type structure consisting of 10 items. Scores obtained from the scale are evaluated as 0-1 point high level, 2-4 points medium level and 5-6 points low self-esteem level. The Cronbach's Alpha of the scale in the original study was 0.71<sup>23</sup>. Cronbach's alpha for this study is .79.

### **Data Collection**

Ethics committee approval for the study was received from the Üsküdar University Ethics Committee (2024-61351342/020-132).

In the data collection phase, an online questionnaire was created through Google Forms, in which forms and scales will be used. The questionnaire was delivered to the participants within the scope of the study. The survey link reached people through social media platforms and e-mail groups. The characteristics of the participants included in the survey were that they were male between the ages of 18-30 and wanted to participate in the study completely voluntarily. For this reason, the Informed Consent Form was displayed on the screen at the entrance to the survey for the participants with these characteristics, and the individuals who wanted to participate in the research by selecting the approval option, while the individuals who did not want to participate were able to close their screens. The questionnaires were completed in approximately 30 minutes.

### **Data Analysis**

All data were saved and analyzed on the computer using the SPSS 22 program. Mediation analysis was performed using IBM SPSS Process Macro 4.1 application. The normality of the data distribution was assessed using the Kolmogorov–Smirnov test, skewness and kurtosis values, and histogram plots. The Kolmogorov–Smirnov test results indicated that the data were normally distributed ( $p > .05$ ). Skewness and kurtosis values ranged between  $-1.5$  and  $+1.5$ , further supporting normality. Analyses were performed with parametric tests.

## Results

When the descriptive characteristics of the individuals who participated in the study were examined, it was determined that the mean age of the individuals was  $24.11 \pm 4.00$ , 77% were undergraduate graduates, 78.20% were single, and the mean BMI was  $25.59 \pm 3.49$ . It was found that 47.20% of the individuals practiced bodybuilding training, and the average training time of the individuals who trained regularly was  $1.88 \pm 1.98$  hours per day (Table 1).

**Table 1.** Descriptive characteristics of the participants (n=500)

|                                                  |                               | n                | %     |
|--------------------------------------------------|-------------------------------|------------------|-------|
| <b>Educational status</b>                        | <b>Literate</b>               | 5                | 1     |
|                                                  | <b>Primary education</b>      | 15               | 3     |
|                                                  | <b>High school</b>            | 78               | 15.60 |
|                                                  | <b>University</b>             | 385              | 77.00 |
|                                                  | <b>Postgraduate</b>           | 17               | 3.40  |
| <b>Marital status</b>                            | <b>Married</b>                | 109              | 21.80 |
|                                                  | <b>Single</b>                 | 391              | 78.20 |
| <b>Status des Bodybuilding-Trainings/ Sports</b> | <b>Yes</b>                    | 236              | 47.20 |
|                                                  | <b>No</b>                     | 264              | 52.80 |
| <b>YAge</b>                                      | <b>Mean<math>\pm</math>SD</b> | 24.11 $\pm$ 4.00 |       |
| <b>BMI</b>                                       | <b>Mean<math>\pm</math>SD</b> | 25.59 $\pm$ 3.49 |       |
| <b>Hours Of Daily Exercise</b>                   | <b>Mean<math>\pm</math>SD</b> | 1.88 $\pm$ 1.98  |       |

BMI: Body Mass Index; n: number of participants; SD: Standard Deviation

The mean score of the "Muscle Dysmorphia Disorder Inventory" was  $28.37 \pm 8.03$ , "Exercise Dependence Scale" was  $49.22 \pm 19.77$ , and "Rosenberg Scale of Self-esteem" was  $20.26 \pm 4.98$  (Table 2).

**Table 2.** "Muscle Dysmorphia Disorder Inventory", "Exercise Dependence Scale" and "Rosenberg Scale of Self-esteem" results related to the mean scores (N=500)

|                                      | Minimum | Maximum | Mean  | SD    |
|--------------------------------------|---------|---------|-------|-------|
| Muscle Dysmorphia Disorder Inventory | 13      | 48      | 28.37 | 8.03  |
| Exercise Dependence Scale            | 21      | 114     | 49.22 | 19.77 |
| Rosenberg Scale of Self-esteem       | 10      | 31      | 20.26 | 4.98  |

SD: Standard Deviation

The total effect of the "Muscle Dysmorphia Disorder Inventory" on the "Exercise Dependence Scale" was statistically significant ( $B=1.08$ ,  $\beta=0.44$ ,  $LLCI=0.89$ ,  $ULCI=1.28$ ). This finding shows that each one-unit increase in the "Muscle Dysmorphia

Disorder Inventory" score causes a 1.08-unit increase in the "Exercise Dependence Scale" score. When the direct effect was analyzed, it was found that the direct effect of the "Muscle Dysmorphia Disorder Inventory" on the "Exercise Dependence Scale" score was statistically significant ( $B=1.17$ ). This finding shows that each one-unit increase in the "Muscle Dysmorphia Disorder Inventory" score causes a 1.17-unit increase in the "Exercise Dependence Scale" score.

When the indirect effect was analyzed, it was determined that the effect of "Muscle Dysmorphia Disorder Inventory" on "Exercise Dependence Scale" was realized through the variable "Rosenberg Scale of Self-esteem" ( $B=-0.08$ ). This finding shows that each unit increase in the "Muscle Dysmorphia Disorder Inventory" score causes a 0.08 unit decrease in the "Exercise Dependence Scale" score through the the "Rosenberg Scale of Self-esteem", in other words, there is a mediation effect.

The effect of the "Muscle Dysmorphia Disorder Inventory" on the "Rosenberg Scale of Self-esteem" was found to be negative and statistically significant ( $B=-0.12$ ). In addition, the effect of the "Rosenberg Scale of Self-esteem" on the "Exercise Dependence Scale" was negative and statistically significant ( $B=-0.69$ ). This finding shows that each unit increase in the "Rosenberg Self-Esteem Scale" score causes a 0.69 unit decrease in the "Exercise Dependence Scale" score.

When the explanatory power of the model was evaluated,  $R^2=0.04$  explaining the effect of the "Muscle Dysmorphia Disorder Inventory" on the "Rosenberg Scale of Self-esteem" and the model was found to be significant ( $F(1,498)=19.89$ ,  $p<0.001$ ). The explanatory model of the Exercise Dependence Scale was  $R^2=0.22$  and the model was found to be significant  $F(2,497)=70.91$ ,  $p<0.01$ . These findings reveal that the effect of muscle dysmorphia on exercise dependence is realized both directly and indirectly through self-esteem and self-esteem plays a mediating role in this relationship (Table 3, Figure 2).

**Table 3.** Results on the mediating role of self-esteem in the effect of muscle dysmorphia disorder on exercise addiction (N=500)

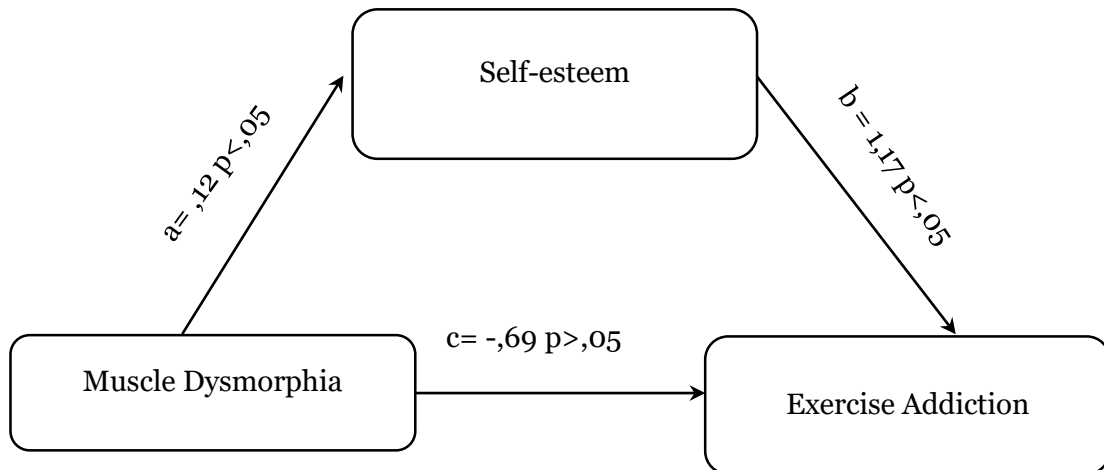
|                                      | Rosenberg Scale of Self-esteem |         |      |      |      | Exercise Dependence Scale   |         |      |       |       |
|--------------------------------------|--------------------------------|---------|------|------|------|-----------------------------|---------|------|-------|-------|
|                                      | B                              | $\beta$ | SE   | LLCI | ULCI | B                           | $\beta$ | SE   | LLCI  | ULCI  |
| Muscle Dysmorphia Disorder Inventory | -0.12                          | 0.20    | 0.03 | 0.07 | 0.18 | 1.17                        | 0.47    | 0.10 | 0.97  | 1.36  |
| Rosenberg Scale of Self-esteem       | ---                            |         |      |      |      | -0.69                       | -0.17   | 0.16 | -1.01 | -0.38 |
| Fixed                                | 16.81                          |         | 0.8  |      |      | 30.24                       |         | 3.94 |       |       |
|                                      | $R^2=,04$                      |         |      |      |      | $R^2=,22$                   |         |      |       |       |
|                                      | $F(1.498)=19.89$ ; $p<.001$    |         |      |      |      | $F(2.497)=70.91$ ; $p<0.01$ |         |      |       |       |

|                 |       |       |      |       |       |
|-----------------|-------|-------|------|-------|-------|
| Total Effect    | 1.08  | 0.44  | 0.10 | 0.89  | 1.28  |
| Direct Effect   | 1.17  | 0.47  | 0.10 | 0.97  | 1.36  |
| Indirect Effect | -0.08 | -0.03 | 0.02 | -0.13 | -0.04 |

B: Unstandardized Regression Coefficient;  $\beta$ : Standardized Regression Coefficient.

SE: Standard Error; LLCI: Lower Confidence Interval (B); ULCI: Upper Confidence Interval (B) \* $p < 0.05$

**Figure 2.** Findings of the analysis series in which self-esteem was evaluated as a mediating variable



Direct effect (c) = 1.17  $p < 0.05$

Indirect effect ( $a*b$ ) = -0.08  $p < 0.05$

## Discussion

In the study, it was determined that almost half of the young men practiced bodybuilding training. Bodybuilding training/ exercise/ sport is mostly preferred by male individuals worldwide because it expresses the ideal body structure for male individuals both socially and culturally<sup>24</sup>. This type of sport is known as a sport that challenges the individual both physically and mentally. In this type of sport, in which the individual makes an important investment in their body, the perceptions of the individual towards their body may also change over time<sup>25</sup>. In a study involving adult individuals who exercise in sports centers in Ankara, it was stated that as individuals place exercise at the center of their lives, they may evaluate themselves as physically inadequate in terms of body image and muscle mass<sup>26</sup>. Since bodybuilding has a lifestyle that requires serious discipline, some

psychiatric disorders are observed in individuals interested in this sport over time<sup>27</sup>. Muscle dysmorphia is a psychiatric disorder that generally affects individuals who engage in bodybuilding sports and causes individuals to feel obsessed by seeing themselves inadequate in terms of muscle mass<sup>28</sup>.

Both men and women experience symptoms of muscle dysmorphia, but research reveals that men generally report much higher levels of symptomatology than women<sup>29,30</sup>. Muscle dysmorphia affects men and young people more than women<sup>31,32</sup>. Arslan et al. (2022) found that muscle dysmorphia symptoms and bodybuilding dependence are often associated with male students<sup>33</sup>. The International Obsessive Compulsive Disorder Foundation states that 0.5% of men may meet the criteria for muscle dysmorphia<sup>34</sup>. Duran et al. (2020) and Merhy et al. (2023) reported high levels of muscle dysmorphia symptoms in male university students<sup>35,36</sup>. Skemp et al. (2013) also reported that male individuals had a higher risk of muscle dysmorphia than females in their study with bodybuilders<sup>37</sup>.

In the study, it was determined that the mean score of "Muscle Dysmorphia Disorder Inventory" was  $28.37 \pm 8.03$  in young men. In the study conducted by Sentürk and Göbel (2024) in male athletes, the muscle dysmorphia scale was  $27.5 \pm 9.09$  and the rate of athletes with muscle dysmorphia was 10.1%. At the same time, it was found that exercise dependence increased as the athletes' scores on the muscle dysmorphia scale increased<sup>38</sup>. In a study conducted with male university students, it was determined that there was a relationship between muscle dysmorphia and bodybuilding dependence<sup>33</sup>. Latorre Román et al. (2016) found a significant association between body dissatisfaction, a key aspect of muscular dysmorphia, and exercise dependence. It seems logical that a person who develops their muscles through physical exercise would develop exercise addiction along with muscular dysformity<sup>39</sup>. Similarly, a positive correlation was found between muscle dysmorphia and exercise dependence in this study.

Because individuals are dissatisfied with their current body shape, they try to achieve an ideal body image, such as being more muscular by exercising more, so this goal can trigger muscle dysmorphia. It is seen that muscle dysmorphia and body image disturbance have a bidirectional interaction, muscle dysmorphia can be triggered when the person is dissatisfied with their current body shape, and as muscle dysmorphia develops, body image perception may deteriorate further<sup>40</sup>. In the study conducted by Selvi and Bozo (2020), it was found that muscularity desire and body dissatisfaction were positively associated with muscle dysmorphia<sup>41</sup>. In the study conducted by Greenway and Price (2020), it was stated that muscle dysmorphia is associated with the individual being ashamed of their own body and feeling small and weak<sup>42</sup>. In another study by Murray et al. (2012), individuals with muscle dysmorphia had poor body perception and did not like their bodies<sup>43</sup>. In the study conducted by Sentürk and Göbel (2024), it was found that body perception disorders increased as the risk of muscle dysmorphia increased in athletes<sup>38</sup>. In their study, Compte et al. (2015) stated that individuals at risk of muscle dysmorphia were prone to low self-esteem<sup>44</sup>. Increased levels of muscle dysmorphia lead to increased negative self-evaluations of body image, which is

associated with decreased self-esteem<sup>45</sup>. Similarly, in this study was a negative relationship between muscle dysmorphia and self-esteem, self-esteem decreased as muscle dysmorphia increased, and the risk of muscle dysmorphia increased when self-esteem decreased.

The remarkable finding of this study is that the mediation analysis revealed that self-esteem a moderating role in the negative effect of muscle dysmorphia on exercise dependence in young men. In other words, muscle dysmorphia shows some of its effect on exercise dependence through self-esteem. High self-esteem has a reducing effect on the risk of exercise dependence. Ertl et al. (2018) found that self-esteem positively predicted exercise dependence<sup>46</sup>. In the study conducted by Wågan et al. (2021), self-esteem and exercise dependence were significantly related to each other<sup>13</sup>. Therefore, it is thought that individuals with high self-esteem do not try to exercise more to increase their satisfaction with themselves. In this direction, it is thought that the risk of exercise dependence in individuals will decrease with programs aimed at increasing self-esteem.

## Conclusion and Recommendations

In conclusion, this study determined that high levels of muscle dysmorphia increase the risk of exercise addiction in young men, and self-esteem plays a moderating role in this relationship. High self-esteem has a mitigating effect on the risk of exercise addiction. In line with this result, young men should be considered a risk group, and early screening programs should be developed for them. It is recommended that psycho-educational programs and group studies aiming to reduce muscle dysmorphia and increase self-esteem should be applied to young men. Individuals should receive training on healthy body image, realistic physical expectations, and the psychological effects of muscular dysmorphia. Awareness-raising programs should be developed, particularly for young men, regarding the effects of social media. Psychosocial programs should be designed to focus on individuals' strengths. Individuals should be encouraged to participate in activities that enhance their sense of achievement and competence. This will prevent self-esteem from being judged solely on physical appearance.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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